

# South African Thysanoptera - 6.

by

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## Suborder TEREBRANTIA

### Family THIRIPIDAE

#### **Caliothrips graminicola** (Bagnall and Cameron) (Figs. 1—8)

1932 *Ann. Mag. n. H.* (10) 10 pp. 412-419.

*Female* (macropterous). Length (distended) 1.2—1.3 mm. *Colour* light brown to blackish brown, with parts of appendages yellow or colourless; *head* yellowish brown between eyes in front of ocelli but with a narrow crescent-shaped dark line (? internal) on each side between anterior ocellus and base of antenna, slightly darker between ocelli and on median dorsal area, distinctly darker on cheeks behind eyes, ventral aspect yellowish brown medially, brown on each side behind eyes; eyes so deep red as to appear black, ocellar crescents bright red; antennae: i grey, ii light brown, darker on inner edge, iii-v yellow, tinged feintly with grey mainly in apical half of each, vi brown, vii and viii pale grey-brown, slightly darker than i; mouth-cone: sclerotized parts brown, labrum and labium black apically, palpi grey; *pronotum* pale brown, like median posterior dorsal part of head, darker brown on lateral edges, on a narrow transverse posterior line, and on inner edges of the two posterior foveae; mesonotum pale brown, about like pronotum, but lighter in median posterior area; metanotum brown, darker than mesonotum, wing-insertion areas and postero-lateral parts of metanotum yellow, lateral parts of pterothorax dark brown; ventrally the pterothorax is mainly light brown; *abdomen*: brown, but distinctly paler on a median area extending longitudinally from i to viii and occupying roughly one-third of width of tergites ii to viii; median paler areas of i and viii paler than those of ii to vii; ix and x also somewhat paler in median dorsal area and darker at sides; ventrally the abdomen is also paler brown medially and darker brown at sides; *wings*: fore pair with four dark areas, as illustrated (fig. 6), the scale and the proximal pale area almost hyaline, the median and distal pale areas feintly and irregularly shaded with pale grey; hind wing with a prominent median dark line extending to a point about 100  $\mu$  from apex; *legs* prominently variegated: all coxae brown, all trochanters and all tarsi (except their dark cups) yellow, all "knees" yellow, but those of hind legs more briefly yellow than other two pairs; fore- and middle femora yellow for about 0.07 of their length at base, brown in

median area which is about 0.6 of length, and yellow in about 0.3 of length at apex; hind femora yellow in basal 0.07 of length, brown in 0.8 of length and yellow in only about 0.13 of length at apex; all tibiae yellow at base in 0.08 to 0.15 of length, and again yellow in 0.3 of length at apex, the rest (0.6—0.7 of length) brown; *setae*: major setae on body and appendages transparent or pale grey, except the following, which are grey to light brown: the long setae on antennae, the apical 6 or 8 costal fore-wing setae, the apical fore-vein seta of fore-wing, the two strong apical fore-wing "fringe" setae, most of the posterior fringe hairs of fore-wing, both fringes of the hind wing and the median large pair on tergite ix.

*Sculpturing* of body, antennae and legs prominent, many parts heavily reticulated or lined, and some of these areas with conspicuous fine wrinkles between the lines or in the reticles. *Head* prominently reticulated dorsally between and behind ocelli and eyes, and also laterally behind eyes, the surfaces of the reticles bearing closely-set fine wrinkles on dorsal aspect of head, except for a transverse caudal band of about four rows of reticles whose surfaces bear only one to six minute dots; laterally, wrinkled reticles occupy about one half of the area behind eyes, extending from the concave emargination of the eyes caudad, with two caudal rows of reticles smooth, and a few of the ventro-medial reticles in the rest of the area also feintly wrinkled; ventrally the surface of the head is rough and wrinkled between and immediately caudad of insertions of antennae, feebly sculptured between eyes, with a few indistinct lines and slightly more distinctly transversely lined behind a line through caudal margins of eyes; mouth-cone also slightly roughened; antennae with transverse lines, as shown on the drawing (fig. 2).

*Pronotum* strongly reticulate, finely wrinkled except on three to five subovate reticles in each of the four conspicuous foveae, the wrinkled reticles mainly elongate, many of them with their long diameters extending more or less cephalo-caudad, but from the mesal edges of the two caudal fovea they radiate like the spokes of a wheel; in a more or less triangular median area between the two large sub-antero-marginal median setae the reticles are irregularly subquadrate; sclerites of prosternum irregularly roughened; *mesonotum* reticulate and wrinkled in a transverse area (about  $34\ \mu$  long by  $72\ \mu$  wide) occupying about one-half of its total length, with a smooth anterior median area about  $13\ \mu$  long by  $55\ \mu$  wide, and a posterior median area about  $25\ \mu$  long by  $85\ \mu$  wide in which the smooth elongate reticles converge more or less obliquely to the median depressed line; laterad of the wrinkled median area the wrinkles tend to disappear and the oblique lines are very close together; *metanotum* reticulate and wrinkled in a slightly raised subtriangular median area about  $64\ \mu$  long by  $55\ \mu$  wide anteriorly, and with smooth mainly elongate reticles on either side of it; the sclerite caudad of the prominent transverse metanotal suture smooth, except, for about ten weakly wrinkled reticles occupying an anterior median area about  $17\ \mu$  long by  $34\ \mu$  wide.

Laterally the *pterothorax* is prominently reticulate and wrinkled dorsad of a line joining the dorsal edges of the coxal cavities; below this line it is

reticulate with only a few of the reticles wrinkled; mesosternum and metasternum weakly reticulate, not wrinkled. *Legs*: all coxae, femora and tibiae reticulate but not wrinkled; the sculpturing of the legs is not shown on the drawing of the head and prothorax.

*Sculpturing of abdomen*: tergites i to viii with a broad longitudinal smooth stripe on meson, its width occupying roughly one-half of the total width of each tergite; on tergite i the smooth area has in its centre about a dozen incomplete reticles which are partly and weakly wrinkled, and tergite ii has a few incomplete short lines medially; the rest of tergites i to viii prominently sculptured on each side with lines, some of which anastomose to form elongate reticles, but the reticles are almost always open at one of their ends, and between these lines the surface is prominently wrinkled, on tergites ii-viii, the wrinkles being about  $1\mu$  apart and the lines about  $4$  to  $9\mu$  apart.

Tergite ix with two transverse rows of reticles near anterior edge, of which a few at sides are feebly wrinkled, and with irregular lines at sides in anterior three-fourths; tergite x feebly lined. Sternites ii to vii prominently reticulated, but not wrinkled, most of the reticles being transversely elongate and arranged in about five rows that are broadly crescent-shaped, with the concavity situated anteriorly; sternites viii, ix and x with prominent anastomosing lines running in the cephalo-caudad direction.

*Head*  $0.7-0.9$  as long as its greatest width, which is across the eyes, and  $1.0-1.2$  as long as the pronotum; antennae spaced rather far apart, the space between them about equal to the width of segment i; cheeks gently rounded near eyes, slightly concave near base of head; owing to length and thickness of mouth-cone the head is tilted forward in mounted specimens; *eyes* large, prominent, bulging, their length about  $0.6$  of head length, dorsal and ventral lengths approximately equal; dorsal and ventral widths about equal, dorsal and ventral intervals approximately the same, facets circular, closely pressed together, except a few on dorsal side opposite posterior ocellus which are distinctly separated from one another; six facets on ventral side of each eye retain a dull yellow colour after treatment with NaOH; *ocelli* situated on the side of a flattened hump about  $15\mu$  high, the anterior margin of the posterior pair on a line through the middle of the eyes, anterior ocellus directed forward, posterior pair latero-dorsad; *head setae* on dorsal surface as illustrated (fig. 1), ventrally there are three pairs of fine pointed setae about  $21-25\mu$  long between the eyes and two similar pairs more or less in a transverse row behind the eyes.

*Mouth-cone* broad and heavy, rounded at apex, reaching across proster-num; palpi, measured on four females: L./W. maxillary segment i:  $5-9/4-6$ , segment ii:  $14-21/3-4$ , labial  $10-15/2-3\mu$ .

*Antennae* as illustrated (fig. 2); the forked sense-cones on iii and iv are both situated on the outer side of the ventral aspect, and they are rather broadly U-shaped; immediately above the insertion of the forked sense-cone on iv there is a thin long seta-like appendage that is probably a sense-organ,

since it is borne on a small plate that does not resemble the usual setigerous puncture; no areola on segment ii.

*Pronotum* 0.9—1.1 as long as the head, and 0.5—0.7 as long as its own width; two transversely-elongate deep foveae, about  $13\ \mu$  long by  $38\ \mu$  wide, are situated about  $35\ \mu$  from posterior margin and  $42\ \mu$  from lateral margin, and two smaller foveae about  $34$ — $38\ \mu$  from the anterior and lateral margins with an oblique ridge just in front of them; three rows of four setae on disc, as illustrated (fig. 1), the front row close to the anterior margin; postero-angular setae 17 to  $30\ \mu$  long, more or less curved or recumbent, all setae rather inconspicuous.

*Mesonotum* subrectangular, drawn out to short sharp points at latero-posterior angles, about 72 long by  $148\ \mu$  wide, a pair of median setae 21—23  $\mu$  long about  $21\ \mu$  from posterior margin, another pair behind them, and a third pair near lateral margins slightly in front of the level of the median pair; lateral edges of mesothorax (as seen dorsally) show about three setae on each side, about  $21\ \mu$  in length.

*Metanotum*: its strongly sclerotized central plate about  $123\ \mu$  wide and  $98\ \mu$  long, with a prominent transverse suture about  $30\ \mu$  from hind margin; one pair of setae about  $25\ \mu$  long situated about  $13\ \mu$  from anterior margin, their interval 38—47  $\mu$ . *Meso-* and *metasternum* with about 11 and 7 pairs of fine setae, 21—25  $\mu$  long, spread more or less evenly over their whole surfaces.

*Fore-wings* long and narrow, as illustrated (fig. 6), with very long fringe hairs at about the middle of the posterior margin; dorsal surface with a dense covering of microsetae, most of them curved, about 4 to  $6\ \mu$  long and about 3 to  $4\ \mu$  apart; some microsetae also on ventral surface on anterior part of ring-vein (= costa); ring-vein conspicuous, and the base of the anterior vein also, as far as its union with the costa, from this point the posterior vein is indistinctly visible about as far as its distal seta; *fore-wing setae*: counted on 12 females: costa bears a row of conspicuous setae, excluding the two longer ones at apex of wing, there are usually 20 or 21, one wing has only 18, two have 19, eleven have 20, six have 21 and four have 22; in addition there are about 20 much finer fringe hairs interspersed between the setae from the fork in the vein distad; the anterior vein from base to junction with costa bears 5—8 setae, on two wings there are 5, on fourteen 6, on six 7, and on two 8 setae; near apex anterior vein bears 2 setae on all twenty-four wings, the apical one further away from costa: it might conceivably belong to the posterior vein; the posterior vein bears 4—7 setae, only two wings have 4, thirteen have 5, five have 6, and four have 7 setae; the scale bears 4 setae near its anterior margin in addition to the usual two long thin setae.

*Hind-wings* long and narrow, practically straight-sided, slightly shorter than fore-wings and about  $40\ \mu$  wide at middle, dorsal surface densely clothed with microsetae that are somewhat shorter than those of fore-wing, and mainly straight, not curved; distal three-fourths with a fringe-like row of setae about

49—56  $\mu$  long on anterior margin, and a fringe of crinkly hairs on hind margin up to about 250  $\mu$  in length.

*Legs* all bear setae more or less like those shown on the figures of the fore-legs; hind tibiae with two conspicuous apical spines about 21—30 long by 2—3  $\mu$  wide at base, and a row of four thinner and shorter setae in apical third on inner side; hind tarsus with two sub-apical setae about 15 long by 2  $\mu$  wide at base.

*Abdomen:* tergites i to vii vary in mid-dorsal length (including posterior fringe) from about 64 to 85  $\mu$ , tergite viii about 101  $\mu$  long; tergites i-viii and sternites ii-vii with a conspicuous, posterior, strongly sclerotized fringe which has a somewhat scalloped caudal margin that bears a few irregular teeth in some specimens; on tergites the fringe is longest in about median one-fifth of total width and on both sides in approximately one-third of width, behind the sculptured areas; but on sternites the fringe is more or less of the same length throughout their width; behind the smooth median area the fringe on each tergite has irregular longitudinal dark lines suggesting the teeth of a comb; but behind the sculptured lateral parts of each tergite these "lines" are much more prominent and more like teeth of a comb, raised above the general level of the fringe, which is drawn cephalad away from the points and minutely striate between the "lines", there being about a dozen of the "lines" behind each sculptured area; the lines in the fringes are less distinct and less like teeth of a comb throughout the width of the sternites; the fringe is about 13  $\mu$  long on meson of tergite i, about 17  $\mu$  on ii, and about 21—25  $\mu$  long on iii-viii.

Tergites i-viii bear one pair of median dorsal pores each about 40  $\mu$  apart on i, 53 on ii, and 64—76  $\mu$  on iii-viii; more or less between these pores each tergite bears a pair of minute setae 4—9  $\mu$  long, their interval about 25—30  $\mu$  on ii-viii, but only 9  $\mu$  on i, and on i they are situated far in front of the pores. *Setae:* in the sculptured areas tergites ii-viii each bear two or three pairs of inconspicuous setae not far from hind margin, about 13—15  $\mu$  long, and tergites iii-viii also have one or two pairs of latero-median setae, more or less adpressed and not easily seen, about 21—38  $\mu$  long, and on viii a pair of postero-angulars about 47  $\mu$  long. Sternites ii-vii on posterior margin (not on fringe) each with three pairs of fine pointed setae about 17—30  $\mu$  long. Tergite ix without pores; for details about setae on tergite ix see "measurements" below. Tergite x divided throughout its length above, with one pair of pores about 20  $\mu$  apart, situated slightly caudad of the middle, with two pairs of apical setae about 40—50  $\mu$  long and a third pair about 20  $\mu$  in length. Ovipositor strong, about 250  $\mu$  long, with conspicuous sharp teeth.

Before selecting specimens from the Pretoria series for measuring, the females were classified according to size, the width of the pterothorax being used as the criterion; head length was not used, because the heads of mounted specimens are more or less tilted owing to the length of the mouth-cone.

*Measurements of one female* (No. X 752—16 from Pretoria) in  $\mu$ , followed in parentheses by the ranges of this plus three other females from

Pretoria, two of these NaOH-treated, (these four Pretoria females including the largest and smallest in the series, plus two intermediates) and one of the cotypes of Bagnall and Cameron from the Sudan:

Length (distended) 1200 (undistended to distended 1050—1260) head L. 121(114—129), W. across eyes 148(—154), W. across cheeks 146(144—152), W. on basal collar 136(—150); eye dorsal L. ?(66—76), ventral L. ?(64—68), dorsal W. ?(34—44), interval ?(76—80), ventral W. ?(34—42), interval ?(70—80); ocelli anterior-posterior 21(21), interval of posterior pair 27(25—27), diameters longit./transv. anterior 9(9)/17(17), posterior 15(15)/9(—11); head setae: antecellars ?(11—13), inter-ocellars ?(17—25), postocellars ?(21—25), postoculars ?(21—27), cheek setae 25(21—); mouth-cone L. from posterior dorsal margin of head 110(106—127); pronotum L. 106(—120), W. 190(169—205), setae: mid-lateral 25(19—30), posterior-angular ?(17—30), disc setae ?(25—30); mesothorax W. 229(219—250); metathorax W. 226(212—254); fore-wing L. 754(708—785), W. across scale 85(—89), W. at middle 51(47—), W. 80  $\mu$  from apex 40(38—42), fringe L. anterior 42, posterior 385(275—); legs, L./W. ff. 99(—120)/34(—38), ft. 85(—106)/36(34—), fta. 42(—64)/21(21), hf. 134(127—141)/30(—38), ht. 134(—141)/30(—32), hta. 71(64—)/21(21); abdomen L. 754(662—823), W. 268(264—310); setae: tergite viii midlateral 34(30—), next caudad 51(—55), near posterior angle 34(—42); tergite ix L. 109(97—114), W. at base 134(127—152); tergite ix setae: midlaterals: inner ?(34—42), outer 51(—59), S.1 (median near caudal margin) 68(—78), S.2 (the next laterad long seta) 101(89—), S.3 (at posterior angle) 68(64—), S.4 (just below S.3) 51(38—55), S.5 (ventral near posterior angle) 68(64—78); segment x: L. 42(—59), its apical setae 49(47—).

Antennae: total L. 261(219—).

Segm.	L.	W.	Segm.	L.	W.
i . . . .	17(15—)	23(23)	v . . . .	36(32—)	21(21)
ii . . . .	36(34—38)	30(27—)	vi . . . .	25(—27)	17(15—)
iii . . .	51(42—)	23(21—)	vii . . .	11(—13)	6(—9)
iv . . .	44(38—)	21(—23)	viii . . .	34(30—)	4(4)

*Male* (macropterous). Length (distended) about 0.9—1.1 mm. Colour and structure very similar to those of female, with the following differences:

#### EXPLANATIONS OF FIGURES.

*Caliothrips graminicola* (Bagnall and Cameron)

Fig. 1—♀, head and prothorax.

2—♂, right antenna.

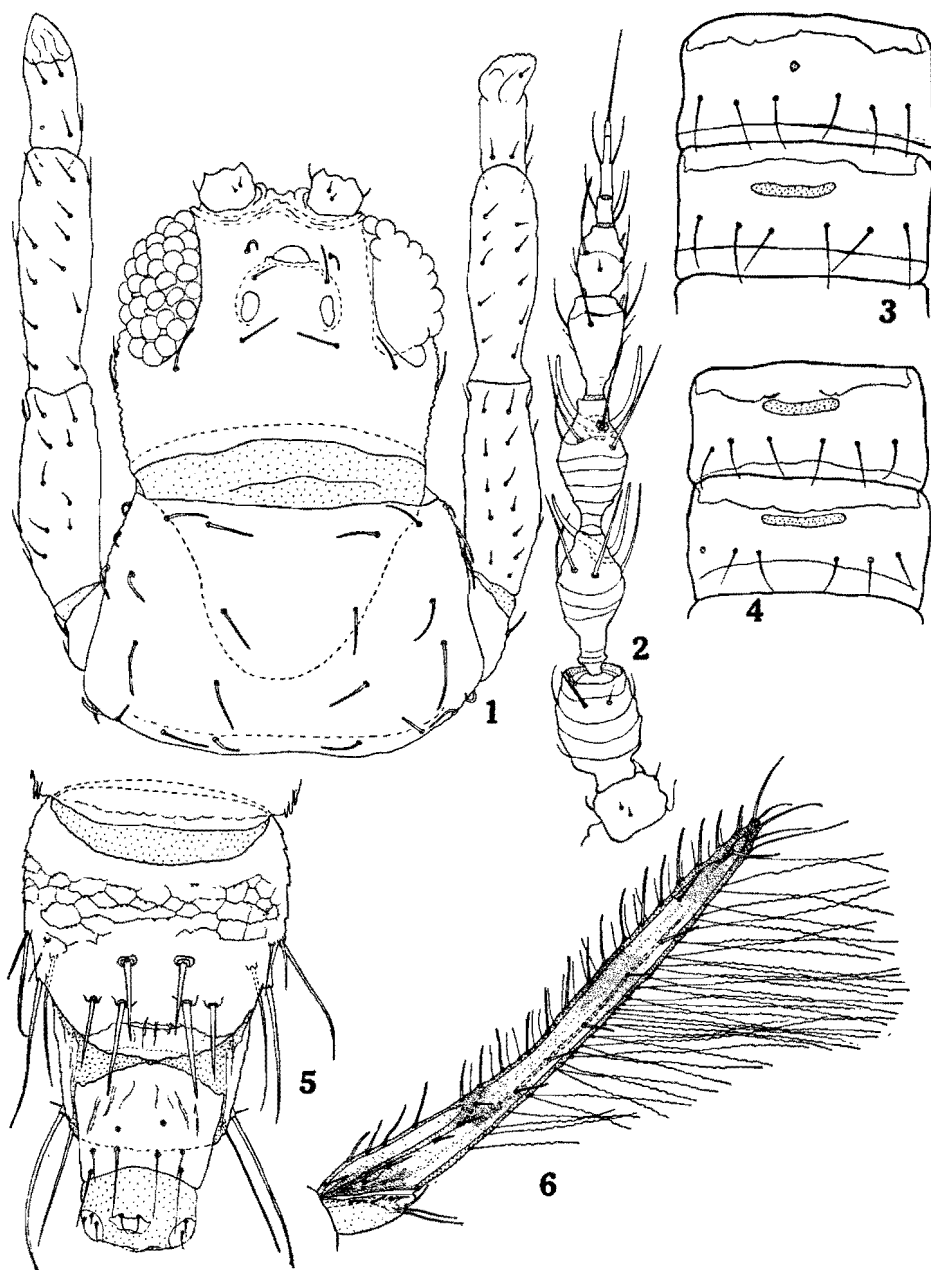
3—♂, sternites iii and iv, showing glandular areas.

4—♂, sternites iii and iv (another ♂) showing glandular areas.

5—♂, tergites ix, x and xi, genitalia omitted.

6—♀, right fore-wing.

Figs. 1—6: Mrs M. Meyer del. (Projection apparatus).



The males are smaller than the females, especially in the width of the body, the abdomen being more slender. In *colour* the males are distinctly paler, on head, thorax and especially on the abdomen, but also in the dark parts of wings and legs; antennae: most males have segments iii-v distinctly darker than those of females, the apical half to two-thirds grey to pale brown, the rest of each segment yellow to greyish yellow; fore-wings: the dark areas generally somewhat paler, the median pale area tending to become more uniformly greyish, and in one of the males it has almost disappeared as a pale area, the two adjacent dark areas being only slightly darker than this "pale" one.

*Colour of legs*: similar to conditions in female, but all "knees" about equally extensively yellow; most of the median brown parts of all femora and tibiae are slightly shorter than in females: the fore and middle tibiae have approximately the following subdivisions: basal yellow 0.2, median brown 0.5 and apical yellow 0.3 of total length; hind femora and tibiae have these subdivisions about 0.2, 0.6 and 0.2 respectively; fore and middle femora have the subdivisions about 0.1—0.2, 0.5 and 0.4 respectively; in addition the brown parts of the legs in the males are distinctly paler in colour than the corresponding parts of the females.

*Sculpturing* as in female except that tergite ix is not lined at sides in posterior half, sternite ix is feebly reticulate and sternite viii shows more or less the same reticulation as sternites ii-vii.

*Fore-wing setae*: counted on 9 males: costa has 16—19, only one wing has 16, seven have 17, seven have 18 and three have 19 setae; on anterior vein from base to junction with costa 5—7 setae: three wings bear 5, thirteen bear 6 and only two bear 7; near apex anterior vein has 3 on one wing, and 2 on seventeen wings; posterior vein 4—6, nine wings have 4, eight have 5 and only one has 6 setae; on scale one wing has 3 whereas seventeen wings have 4 setae.

*Abdomen*: the posterior fringe is well developed on sternite viii in the males, and its length on tergites iii-viii is only about 13—15  $\mu$ . The dorsal pores are closer together in the males, the intervals on tergite i about 34, on iii-viii about 47-64  $\mu$ . Tergite ix bears three pairs of prominent dorsal setae as illustrated (fig. 5) and two pairs of large latero-median pairs.

*Glandular areas* on sternites ii-vii, measured on 7 ♂♂ from Pretoria and two of Bagnall and Cameron's paratypes from the Sudan: their length varies from about 2 to 4  $\mu$ ; sternite iii: on one male it is absent, on the other eight it varies in width from 4 to 34  $\mu$ , as illustrated (figs. 3 and 4); the width on the other sternites ranges: iv: 23—55, v: 25—51, vi: 30—53, vii: 30—47  $\mu$ ; the surface of the glandular areas has a granular appearance.

These figures show that the width of the glandular areas on the sternites varies within wide limits, especially on sternite iii. Bagnall and Cameron (1932) gave 13—14  $\mu$  for the width on iii, but I find a width of only 4  $\mu$  on one of their paratypes; this shows how desirable it is to study and measure

more than one or two specimens, in order to give indications of the variations that are likely to be encountered.

**Genitalia:** The figure of the lateral aspect of the tip of the abdomen (fig. 8) is a drawing of one specimen, but that of the dorsal aspect of the genitalia (fig. 7) is a semi-schematic representation of the conditions seen in the series of males. The terminology of the subdivisions of the genitalia used by Hartwig (1952 Un. So. Afr. Ent. Mem. Vol. 2 part 11) is followed here. Even in males with the genitalia fully distended and extruded, some of the basal parts lie under the tenth and eleventh tergites, therefore only the genitalia are shown on the figure of the dorsal aspect (fig. 7). The strongly sclerotized hypophallic ears (hphe) lie on each side of the slightly transverse, more or less rounded epiphallus (eph.). The three hypophallic processes (hphp) are curved upwards and the median one is slightly longer than the other two. The membranous, hyaline phallus (ph-1, 2 and 3) lies above the three processes, does not bear any sclerotized spikes, and consists of an anterior, somewhat lower portion (ph-1), which is divided into a left and a right bulbous lobe, a larger posterior bulb (ph-2) and a more delicate connecting portion (ph-3). As seen dorsally the phallus as a whole projects laterally over the hypophallic processes. The ductus ejaculatorius (dej) leads to the gonopore (gp) which lies in the deep depression between the two lobes of the anterior part of the phallus (ph-1).

**Measurements of one-male** (No. X 752-3 from Pretoria) in  $\mu$ , followed in parentheses by the ranges of this plus two other Pretoria males, one of these NaOH-treated, (these three Pretoria males including the largest and smallest in the series, plus one intermediate), and one of the Bagnall and Cameron paratypes from the Sudan, which is incomplete, therefore some measurements e.g. those of the antenna, of the second paratype before me have been substituted for the missing data: Length (distended) 1031(990-1054); head L. 93(—113), W. across eyes 136(131—), across cheeks 131(129—), at base 119(—123); eye dorsal L. 59(—68), ventral L. 64(59—) dorsal W. 34(—36), interval 68(63—), ventral W. 34 and 36(—38), interval 66(62—); ocelli anterior-posterior 17(15—), interval of posterior pair 25(23—), diameters longit./transv. anterior 6(—9)/17(13—3, posterior 13(13)/9(6—); mouth-cone L. from posterior dorsal margin of head 110(85—), palpi L./W. maxillary i: ?(6—9)/?(4—6), ii: ?(15—19)/?(3—4), labial ?(13)/?(2); pronotum L. 85(—93), W. 158(140—); mesothorax W. 197(176—), metathorax W. 190(172—); fore-wing L. 554(—593), W. across scale 72(67—74), W. at middle 42(38—), W. 80  $\mu$  from apex 38(36—), fringe L. anterior 38(21—), posterior 261(—275); legs L./W. ff. 93(—106)/32(30—), ft. 97(89—99)/34(28—), fta. 59(49—)/19(17—), hf. 97(—120)/34(30—), ht. 119(113—127)/27(25—), its apical spurs 30(17—), hta. 64(56—)/17(17); abdomen L. 662(539—), W. 190(169—); tergites L. i: 55(47—), ii: 57(51—), iii: 53(51—), iv: 59(51—), v: 61(51—), vi: 55(—57), vii: 64(55—), viii: 64(55—), ix: 72(64—76), x: 36(34—38); setae on tergite ix: S.1 (median dorsal pair, slightly cephalad of other two pairs) L. 30(19—), W. at base

about  $4\mu$ , S.2: 38(27—), S.3: 32(25—), lateral setae anterior 51(30—), posterior 51(42—).

Antenna total L. 240(200—)

Segm.	L.	W.	Segm.	L.	W.
i . . .	15(13—17);	21(17—);	v . . .	34(27—)	19(17—)
ii . . .	34(30—)	27(25—);	vi . . .	23(19—25)	15(13—17).
iii . . .	47(38—)	23(21—);	vii . .	11(9—)	6(6)
iv . . .	42(34—44)	23(21—);	viii . .	32(23—)	4(4)

Material studied: two ♀♀, cotypes and two ♂♂, paratypes, Sudan, Merebea, 21-ix-1930 on "dura", W. P. L. Cameron, B.M. 1933-628, kindly sent to me on loan by the authorities of the British Museum; 46 ♀♀ and 18 ♂♂, about 20 miles north-east of Pretoria, 10-iv-1956, on the grass *Bothriochloa insculpta* (Hochst.) A. Camus, collected by my colleague Dr. S. Schöll.

Although there are small differences between the Sudan specimens and my series from Pretoria, such as a slightly shorter antenna, and third and fourth antennal segments 8 or  $9\mu$  shorter in the male from the Sudan, I am satisfied that the South African specimens belong to the species *C. graminicola* (Bagnall and Cameron).

This species differs strikingly from *C. helini* (Hood), the only other species of the genus thus far recorded from the Union of South Africa, in the following characters: fore-wings pale in the middle, with four dark areas instead of three, and without any blackish brown wing-vein setae; third and fourth antennal segments much paler; abdominal tergites laterally striate and with prominent wrinkles between the striae; glandular areas on abdominal sternites of male narrower, about 0.3—0.4 as wide as sternites on v and vi, as against 0.5—0.6 in *helini*.

### HERCINOTHRIPS Bagnall 1932.

1932 Bagnall, *Ann. Mag. n.H.* (10) 10: 506.

*Typus generis: Heliothrips bicinctus* Bagnall

Keys for the identification of the species.

#### Females

1. Fore-wings mainly dark, with a large median dark area occupying about 0.5—0.7 of wing length, and with pale areas at base and apex . . . . . 2
- Fore wings with two prominent subequal dark cross-bands, separated by a median pale area more or less equal to them in size . . . . . 3
2. Pterothorax and hind femora yellow . . . . . *jansei* spec. nov.
- Pterothorax and hind femora brown . . . . . *femoralis* (Reuter).
3. Head and pronotum yellow or partly yellow . . . . . 4
- Head and pronotum brown . . . . . 5

4. Head and pronotum, and usually pterothorax, yellow; abdominal segments ii-vi brown; microtrichia on ii-vi of abdomen . . . *dimidiatus* Hood.
- Head and pronotum yellow with brown areas; abdominal segments ii-vii brown; microtrichia on ii-iv of abdomen . . . *bicinctus* (Bagnall).
5. Third antennal segment more than three times as long as wide; pronotum more than 2.5 times as wide as long . . . *pattersoni* (Bagnall).
- Third antennal segment less than three times as long as wide; pronotum less than 2.5 as wide as long . . . . . 6
6. Sixth antennal segment and middle tibiae more or less dark; length about 1.2—1.4 mm . . . . . *tenuis* Hartwig.
- Sixth antennal segment and middle tibiae yellow; length about 1.5—1.7 mm. . . . . *brunneus* Hood.

#### Males

Males unknown in *jansei* spec. nov. and *pattersoni* (Bagnall).

1. Glandular areas of sternites iii-vii of abdomen about 50—70  $\mu$  wide  
*dimidiatus* Hood
- Glandular areas of sternites iii-vii about 4—21  $\mu$  wide, or absent . . . 2
2. Glandular areas absent from sternites of abdomen . . . *femorialis* (Reuter).
- Glandular areas present, 4—21  $\mu$  wide . . . . . 3
3. Third pair of spines on tergite ix of abdomen almost as thick as the other two pairs, and situated about 1.1—1.7 times as far apart as the first pair . . . . . *bicinctus* (Bagnall).
- Third pair of spines on tergite ix distinctly thinner than the other two pairs, and situated about 1.9—2.5 times as far apart as the first pair . . . 4
4. Antennal segment vi yellow . . . . . *brunneus* Hood.
- Antennal segment vi dark . . . . . *tenuis* Hartwig.

#### *Hercinothrips bicinctus* (Bagnall) (Figs. 9—14)

1919 *Heliethrips bicinctus* Bagnall, *Ann. Mag. n. H.* (9) 4: 258

1937 *Hercinothrips bicinctus*: Hood, *Ann. Mag. n. H.* (10) 19: 108.

Although this species is the type of the genus *Hercinothrips* Bagnall 1932, I have been unable to find anything in the literature that deserves to be called a scientific description of the species, therefore I am describing and illustrating it here. It is known as a pest on bananas in South Africa and in Queensland, Australia, being known in the latter country as the "banana silvering thrips", but it is apparently not of much importance there.

*Female* (macropterous). Length (more or less distended) about 1.3—1.6 mm. *Colour*: abdomen mainly brown, head and thorax paler, antennae yellow, legs and wings variegated; head brownish yellow above and below, but light brown behind eyes, dorsally, laterally and ventrally, the inner edge of this darker area extending dorsally on each side from near middle of hind margin of eyes obliquely mesad to hind margin of head at a point directly caudad of inner margin of eye, and ventrally also obliquely mesad, but starting from cheeks behind eyes; eyes so deep red as to appear black,

ocellar crescents bright red; *antennae* yellow, i and ii slightly deeper yellow than iii-vii, ii sometimes shaded grey especially at sides and base, viii grey; mouth-cone with sclerotized parts and labium light brown, rest yellow, palpi pale grey; *pronotum* yellow, with a median longitudinal irregular light brown stripe about  $40\ \mu$  wide and one or two transverse light brown patches on each side between it and lateral edges, where there is a curving irregular, broken, brown to blackish brown cephalo-caudal line on each side, about  $6\text{--}10\ \mu$  wide and situated about  $10\text{--}15\ \mu$  from extreme edge (these dark lines are the sides of the raised central surface of the pronotum); about  $13\ \mu$  from hind margin there is a narrow transverse brown line on pronotum; prosternal sclerites light to dark brown; *pterothorax* mainly yellow dorsally but brown on edges, mesonotum yellow with light brown patches occupying roughly one-fourth of width at each side, scutellum of metanotum mainly pale brown with its edges darker in caudal half; meso- and metasternum mainly yellow in median third, sides brown.

*Wing-colour*: fore-wings with two prominent brown cross bands, and three pale areas, as illustrated (fig. 11); the basal pale area is mainly yellow in front of scale and somewhat distad of it. According to Bagnall (1919, p. 258) the first dark brown band occupies about one-eighth of the length of the wing and the other about one-seventh, whereas Hood (1937 p. 108) stated that the dark cross-bands of the fore-wings are much narrower than the pale band between them. I have measured the dark and pale areas on 23 wings of 23 females representing 8 of the localities listed below at the end of the discussion of this species, with the following results. Total length of fore-wing  $769\text{--}923\ \mu$ , thirteen falling between  $831$  and  $862\ \mu$ ; the basal dark band comprised  $0.13$  to  $0.23$  of the total length of the wing, fifteen wings falling in the groups  $0.13\text{--}0.15$ , and it was  $0.4\text{--}1.1$  as wide as the median pale area, 16 wings giving ratios of  $0.4\text{--}0.5$ ; the distal dark band comprised  $0.13\text{--}0.22$  of the total wing length, 15 wings giving ratios  $0.15\text{--}0.17$  while 4 gave  $0.20$ , and it was  $0.5\text{--}1.0$  as wide as the median pale area, 18 of the wings giving ratios of  $0.5\text{--}0.7$ . These figures show that there is considerable variation in the relative widths of the two dark bands and the pale area between them, both dark bands sometimes being as wide as the pale area, although they are usually only about half as wide. The series taken on arum lily at Glencairn on the Cape Peninsula has the dark cross bands slightly wider than the other series, but there is sufficient overlapping to show that they all belong to one species. The apical pale area is small, its width varying from  $69$  to  $92\ \mu$ , but in most cases it is about  $77\ \mu$  wide. The measurements of the subdivisions of one wing, with more or less average values, in  $\mu$  are: basal pale area  $246$ , basal dark band  $123$ , median pale  $262$ , distal dark band  $139$  and apical pale  $77$ , total wing length  $847$ .

Hind wings mainly clear, but with a prominent median dark line, which is sometime distinctly darker in certain parts, usually beginning about  $150\text{--}200\ \mu$  from base, the darker part about  $150\text{--}250\ \mu$  long; in addition some hind wings show feintly darker, greyish bands, corresponding in position with the dark bands on the fore wings.

*Colour of legs:* fore and middle coxae grey to light brown, hind coxae light brown; all trochanters yellow; fore femora, fore and middle tibiae largely yellow but with a variable amount of grey to brown shading, mainly in basal third or near middle, middle femora almost wholly brown, with about one-eighth at apex yellow; hind femora variable, sometimes almost wholly brown with perhaps one-eighth at base yellow, or with about one-third at apex brown and basal two-thirds yellow; hind tibiae wholly yellow; all tarsi yellow with very small grey cups. *Abdomen:* i yellow, ii-vii uniformly brown above and below, with one conspicuous, transverse, basal dark to blackish brown line on tergites ii-vii, and two basal dark lines on sternites iii-vii; viii above and below brownish yellow, with about one fourth of width brown on each side, ix brownish yellow above and below, x yellow shaded light brown in about apical one-fourth.

*Colour of setae:* all major setae on body, antennae and legs pale, colourless, yellow or feintly grey; on fore wings: fringes yellow or slightly grey except some of the fringe hairs on the dark bands which are grey, setae on costa and both veins yellow or colourless, except those standing on the dark bands, which are grey to brown; hind wing fringe hairs mainly yellow, sometimes feintly grey.

*Sculpturing:* head, thorax, abdomen and legs prominently and beautifully reticulated, the surfaces of the reticles wrinkled on parts of thorax; *head* strongly reticulated on whole dorsal aspect, except for a transverse area, about 9—15  $\mu$  long, on caudal margin which is minutely asperate, medially, also strongly reticulated on lateral aspect behind eyes, but only feebly reticulated ventrally; in a few females some of the reticles between the ocelli, and in the hindmost four rows on dorsal aspect of head weakly wrinkled; *antennal* segments i-vi with prominent transverse lines; *pronotum* reticulated except between caudal margin and the prominent transverse line which is situated about 13—17  $\mu$  from it, this caudal band showing lines only; reticles on pronotum usually subquadrate or subhexagonal, with weaker walls than on head, their surfaces wrinkled, except for about 10 reticles in a transverse area near middle on each side of median brown stripe, the wrinkles about as distinct as in *Hercinothrips femoralis* (Reuter), but not as prominent as in certain species of *Caliothrips* Daniel; *mesonotum* practically smooth in a cephalic subtriangular area about 20 long by 70  $\mu$  wide, strongly reticulated in a transverse band about 35  $\mu$  long, which has about 4 rows of cells, of which the two foremost consist of larger cells, subreticulate in posterior area, which is about 30  $\mu$  long, the surface wrinkled in a posterior median area about 40 long by 85  $\mu$  wide.

*Metanotum:* the scutellum reticulate and usually wrinkled in anterior half but the wrinkles feeble; rest of anterior sclerite and the posterior subreticulate; laterally the pterothorax is reticulate but not wrinkled, ventrally it is more weakly sculptured with anastomosing lines that form elongate, transverse reticles, and also not wrinkled. *Legs:* all coxae, femora and tibiae rather strongly reticulate. *Abdomen:* tergite i with a prominent semicircular

antecostal line and feebly reticulate behind it; tergites ii-vii with prominent antecostal lines and heavy reticulation over whole surface behind them, only a small cross-band on posterior margin of each tergite remaining smooth; on tergites iii-vii many of the reticles are clavate, lying with their long axis cephalo-caudad, with the widest part or club in front, the length of a medium-sized typical club about 25 and its greatest width about  $9\mu$ , and usually (in NaOH-treated females) the handle of the club is darker in colour than the rest of the reticle; on a tergite whose total width in dorsal aspect is about  $350\mu$ , the distinctly clavate-reticulate area occupies about  $250\mu$  of the width, while the more sharply sloping parts, about  $50\mu$  wide on each side, appear to have the reticles more closely pressed together; in laterally mounted specimens one sees that the reticles extend to about  $40-50\mu$  from the pleural sclerites and that the lateral  $40-50\mu$  of the tergites are sculptured with weaker cephalo-caudal lines, which are about  $4\mu$  apart and form only a few reticles; tergite viii sculptured like vii but more weakly, the reticles obsolescent in a slightly larger medio-caudal area; in front of the antecostal line on tergites iv-viii the surface is also reticulated, but much more weakly, with transverse irregular reticles; tergite ix feebly sub-reticulate, most of the transverse lines minutely asperate; tergite x only very feintly sculptured.

Sternites iii-vii with prominent curved anterior dark brown transverse lines, about  $13\mu$  long cephalo-caudally, whose convexity lies cephaled, and projects under the posterior fringe of the sternite in front of it, and also with much finer ante-costal lines; on sternites ii-vi the reticulation on the median third of each is similar to that on the median parts of the tergites, but weaker and less regular; on the lateral two thirds of each sternite the cephalo-caudal lines are closer together (about  $2-4\mu$  apart) and they form comparatively few reticles; sternite vii more weakly subreticulate and almost smooth in posterior half of about middle one-third; sternites viii and ix reticulate.

Pleural sclerites are prominent on segments ii-vii of the abdomen; they are sharply demarcated by dorsal and ventral sutures but not clearly sub-

#### EXPLANATIONS OF FIGURES.

*Caliothrips graminicola* (Bagnall and Cameron).

Fig. 7 — ♂, semi-schematic drawing of extruded genitalia, dorsal aspect: dej. - ductus ejaculatorius; eph. - epiphallus; gp. - gonopore; hphe. - hypophallic ear; hphp. - hypophallic processes; ph. 1. 2. 3 -sub-divisions of the phallus.

8 — ♂, lateral aspect of tip of abdomen: ph. 1, 2 - phallus.

*Hercinothrips bicinctus* (Bagnall).

Fig. 9 — ♂, tergites ix and x, dorsal aspect.

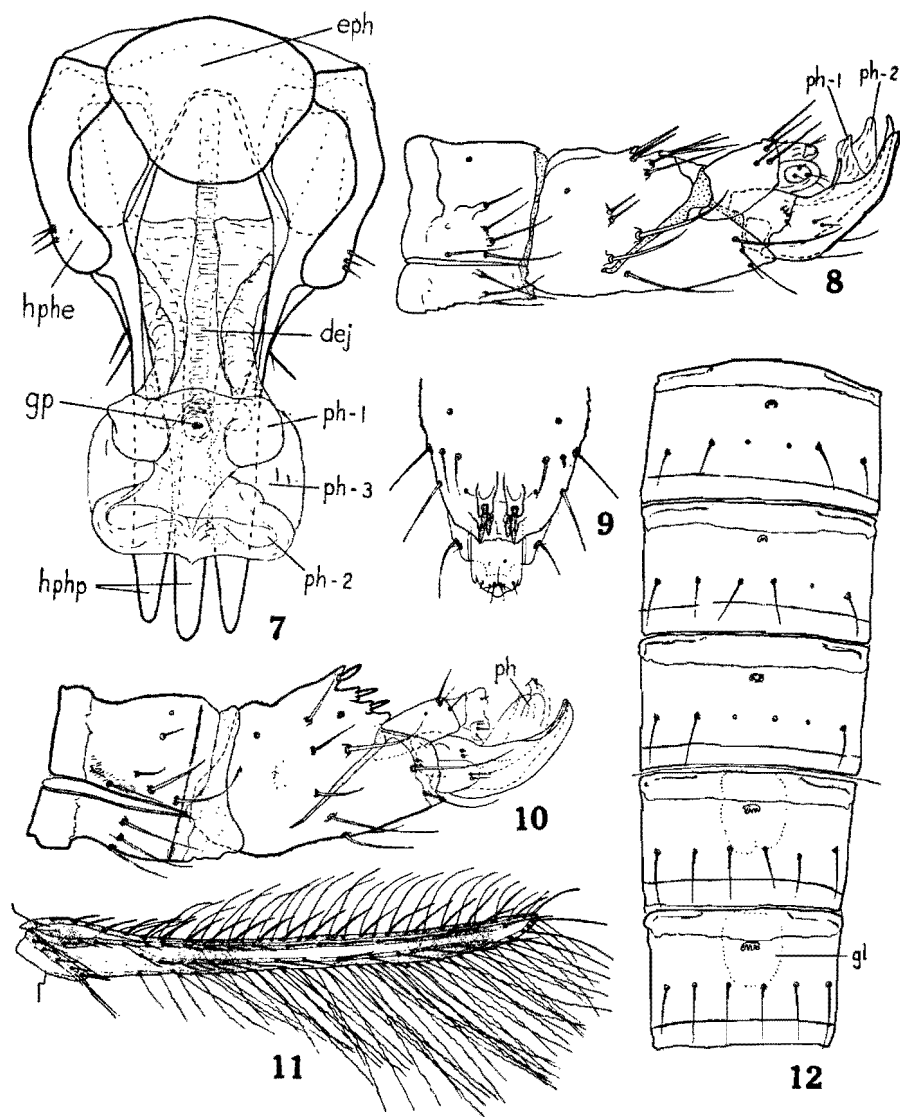
10 — ♂, tip of abdomen, lateral aspect: ph. - phallus.

11 — ♂, right fore-wing.

12 — ♂, sternites, showing glandular areas; three upper segments: sternites iii-v of a ♂ NaOH-treated; two lower segments: sternites vi and vii of another ♂, not NaOH-treated; gl. - outline of internal gland.

Figs. 7, 9—12: Dr R. zur Strassen del.

Fig. 8. Mrs M. Meyer del. (Projection apparatus).



divided into two; these sclerites also bear prominent longitudinal lines, close together, sometimes forming reticles.

*Head* wider than long, the ratio  $L/W$  being 0.6 for both  $W.$  across eyes and greatest  $W.$  across cheeks, which is about 2 to  $14\ \mu$  wider than  $W.$  across eyes; head  $L.$  is approximately equal to  $L.$  of pronotum; head  $W.$  across eyes 1.1—1.2 of least  $W.$  at base; *eyes* large, prominent, bulging, coarsely and closely faceted, their dorsal length about 0.6 of total head length and only 5— $10\ \mu$  longer than ventral length in specimens with the head not tilted; six facets on ventral side of each eye retain a yellow colour in specimens treated with  $NaOH$ ; *cheeks* rounded behind eyes, with a notch in lateral outline of head where eyes meet edge of cheeks; cheeks drawn out at base into a blunt point, behind which they are constricted to form the basal collar, which is about  $10\ \mu$  long on mid dorsal line and about  $17\ \mu$  at sides; inter-antennal projection broad, about equal to width of first antennal segment; *ocelli* on a raised, flattened hump that is about  $9\ \mu$  higher than general dorsal level of head, the anterior directed obliquely forward, the posterior pair obliquely laterad; dorsal *head setae* as illustrated (fig. 13); there is no seta close to and immediately behind the inner dorsal posterior angle of the eye, while there is a seta in this position in *brunneus* Hood, *dimidiatus* Hood, *femorialis* (Reuter), *tenuis* Hartwig, and *H. jansei* spec. nov. described below; cheek setae weak, only about  $13\ \mu$  long; ventrally: a pair of pointed setae close to middle of insertion-point of each antenna, two similar pairs about on a line through middle of eyes, the outer pair against the eyes, another pair near inner posterior angle of eyes and close to them, two or three setae on cheeks behind eyes, four in a row at base of mouth-cone, two on each maxilla basad of palpi, and two pairs on labrum, all these setae approximately 25— $30\ \mu$  long.

*Mouth-cone* extending across about three-fourths of prosternum, broadly rounded at apex, apical rounded lobe of labium about  $47\ \mu$  wide, projecting about  $17\ \mu$  beyond apex of labrum, and bearing ventrally a circular roughened area about  $25\ \mu$  in diameter, with fine ridges and about half a dozen minute tooth-like projections; palpi measured on 3 ♀♀,  $NaOH$ -treated, mounted laterally:  $L./W.$  in  $\mu$ , maxillary segment i: 15—19/9, ii: 23—27/4, its terminal setae 11— $13\ \mu$ , labial 13—17/3, terminal setae 4— $6\ \mu$ .

*Antennae* as illustrated (fig. 14); the forked sense cone on iii situated laterally on outer side, usually V shaped, rarely with a stem about  $2\ \mu$  long, therefore in these cases Y shaped, length of arms about 21— $25\ \mu$ ; width at base about  $2\ \mu$ ; the forked cone on iv situated ventro-laterally on outer side, V shaped, its arms about 30— $34\ \mu$  long and  $2\ \mu$  wide at base; immediately above the forked cone, on dorsal side of segment iv there is a seta-like appendage, somewhat longer than forked cone, which may be a sense-organ, since it is borne on a small plate that does not resemble the usual type of setigerous puncture; the simple cone on outer side of segment v is about 11— $13\ \mu$  long; vi bears an inner simple cone about 51— $59\ \mu$  long and an outer 9— $11\ \mu$  long, while the simple cone on the outer side of vii is about

30  $\mu$  in length; areola on segment ii very indistinct, minute, situated dorsally at apex.

*Pronotum* transverse, about 0.5 as long as its own width, and 0.9—1.0 as long as the head; surface with two transverse grooves, the anterior about 30  $\mu$  from anterior margin, its sides sloping gently, its depth about 4—6  $\mu$ , the posterior about 21  $\mu$  from hind margin, its sides steep, its depth about 6—10  $\mu$ ; the main surface is slightly raised medially, sloping very gently towards sides, but about 13  $\mu$  from lateral edges there is a dark line, broken at the two grooves, and bearing about 4 prominent setae, some of these on small tubercles, this line being the upper edge of a sudden declivity, dropping down almost vertically to a more or less smooth ledge about 16  $\mu$  lower, this ledge rounded in outline as seen from above; median dorsal apodeme visible at about posterior third of length of pronotum, about 20  $\mu$  long.

Setae on disc of pronotum in three transverse rows, but somewhat variable in number and position; on 10 females representing eight localities, I find 18—21 setae, excluding the six on hind margin.

*Mesonotum* semi-circular in front, drawn out to rather sharp points laterally, hind margin nearly straight in about median half, thence sloping cephalo-laterad to lateral points, two pairs of setae near hind margin (median half) about 13—17  $\mu$  long, three other shorter pairs near lateral extremities and a pair of pores at anterior margin of reticulated area. *Metanotum* divided by transverse suture into two strongly sclerotized sclerites, the anterior more than twice as long as the posterior, the anterior differentiated medially into a scutellum whose sides are fairly well demarcated in posterior half, scutellum about 70  $\mu$  long, 50 wide at anterior end and about 15  $\mu$  wide at posterior end, bearing one pair of setae about 17—30  $\mu$  long and a pair of pores about 4  $\mu$  in diameter and 20  $\mu$  apart. Meso- and metasternum each with about 8—10 pairs of fine setae about 21  $\mu$  in length.

*Wings*: fore-wing as illustrated (fig. 11), its surface densely clothed with microtrichia about 6—9  $\mu$  long, many of them bent; ring-vein, anterior and posterior vein present, the ring-vein prominent at base and apex on anterior edge of wing, less distinct elsewhere, the two other veins well-defined throughout their length; wing-setae, counted on 13 wings of 13 ♀♀ representing seven out of the nine localities listed below and including the largest and smallest females (as determined by head width) in the series before me: costa has 20—25 setae, excluding the long apical one, their maximum length about 70—95  $\mu$ , those near apex rather similar to the fringe hairs; fringe hairs on anterior edge about as thick as the costal setae, but much longer; anterior vein bears 3—5, usually 4 setae basad of the fork, 11—16 beyond fork, total 15—20, the numbers 17, 18 or 19 occurring on 11 of the wings, their maximum length 55—72  $\mu$ ; posterior vein with 11—16 setae, 13, 14 or 15 being found on 9 wings, maximum length 68—80  $\mu$ ; the scale shows a prominent vein near anterior margin, with 5 setae (not counted on all 13 wings) in addition to the usual two close together near apex on hind margin; *hind wing* narrower

than fore-wing, with a prominent fringe on anterior margin, similar to that on fore-wing, but slightly shorter, and with 4—5 very fine hairs about 13—25  $\mu$  long in the intervals between the fringe hairs; fringe on hind margin similar to that on fore-wing but shorter; a prominent median vein extending nearly throughout length of wing, with two conspicuous curved setae on it about opposite apex of scale of fore-wing.

*Legs:* hind coxae large, about 68—76  $\mu$  wide, only about 15—25  $\mu$  apart; hind tibiae with two prominent spurs at apex on inner side, 27—30  $\mu$  long and 3—4  $\mu$  thick at base, and with a row of 10—11 thinner setae about 25  $\mu$  long forming a comb on inner side throughout their length; hind tarsi with median setae 21—34  $\mu$  long, apical ones 13—17  $\mu$ .

*Abdomen* so compactly constructed that only a few of the specimens macerated in NaOH are sufficiently distended to show some of the inter-segmental membranes; there is some overlapping of successive segments in all specimens, especially towards the apex of the abdomen. Length of tergites on median dorsal line, measured on one NaOH-treated female of intermediate size: i: 64, ii: 120, iii: 127, iv-viii: 130—137, ix: 95 and x: 76  $\mu$ .

The antecostal line on tergite i has its convexity pointing cephalad, while on ii the line is only weakly arched with the convexity pointing caudad; on iii-viii the antecostal lines nearly straight; tergites iii-viii have cephalad of the antecostal line a darker (NaOH-treated specimens) transverse band about 25—35  $\mu$  long on middorsal line, extending completely across the segments and giving the abdomen a banded appearance, and showing internally a still darker transverse band about one-third as long as the whole dark area; sternites iii-vii bear similar transverse reticulated bands on their anterior margins, 35—50  $\mu$  long on midventral line, their anterior edges gently arched and projecting into the segments in front of them, these ventral bands differentiated into two, an anterior darker internal portion, about 15—18  $\mu$  long on mid-ventral line, and a paler posterior part about 20—30  $\mu$  long.

Tergites i-viii and sternites ii-vii with prominent sclerotized fringes posteriorly, about 9  $\mu$  long on tergite i, 21  $\mu$  on iii and increasing to about 30  $\mu$  on vi-viii; in the median area of the intermediate tergites and across the full width of the intermediate sternites, the fringe shows prominent longitudinal dark lines about 6—9  $\mu$  wide, with paler spaces about 4  $\mu$  wide between them, these lines suggesting the teeth of a comb, but in about one-seventh to one-fifth of the width of the tergites on each side the resemblance to a comb becomes much stronger, the lines becoming narrower, more sharply defined and tooth-like, while they are drawn out into about 15—20 sharp teeth or "spines" about 15  $\mu$  long and 1  $\mu$  thick on each side of tergite viii, leaving a median area of hind margin about 65  $\mu$  wide without such a comb.

*Abdominal chaetotaxy:* tergites ii-iv with microtrichia at sides, best seen on specimens NaOH-treated and mounted laterally; on ii the microtrichia are so densely crowded that one can only see the individual trichia at the edges of the area, which is about 85  $\mu$  wide, dorso-ventrally, as measured from the

margin of the pleural sclerite on laterally mounted females, while it extends over the full length of the tergite; on iii and iv the microtrichia are less dense and are seen on an area about  $76\ \mu$  wide that extends from the antecostal line more or less to the hind margin of the tergite (excluding fringe); on some females a few (6—12) microtrichia also occur on tergite v.

Tergite ii with four pairs of strong setae about  $42\text{--}44\ \mu$  long, at sides in the strongly sculptured area, only those projecting over the edge are readily seen; tergites iii-vii with three pairs; tergite viii with a large pair at hind angles, about  $76\ \mu$  long, a pair about  $55\ \mu$  long immediately in front of spiracles and three or four pairs about  $40\ \mu$  long behind spiracles near hind angles; tergite ix with three pairs of large setae on hind margin, x with two slightly shorter pairs; tergite i with a pair of dorsal pores near hind margin about  $42\ \mu$  apart; ii-vi have one pair of pores about  $130\text{--}148\ \mu$  apart and a pair of very fine setae between them; on vii and viii the pores about  $100\text{--}110\ \mu$  apart, on ix about  $47$  and on x about  $9\ \mu$  apart; in addition to the setae mentioned, tergites iii-vii have a pair of thin setae about  $20\ \mu$  long outside of the pair of pores. Sternites ii-vi have three pairs of setae about  $21\text{--}34\ \mu$  long near hind margin (not on fringe); on vii there are these three pairs, plus two pairs on the fringe; sternite ix with five pairs  $51\text{--}64\ \mu$  long.

*Ovipositor* strong, about  $270\ \mu$  long, with sharp triangular teeth about  $4\ \mu$  long. Tergite x split above, only about  $15\ \mu$  at anterior end not split.

*Size*: in order to determine the range of sizes found in the females, the head width across cheeks and the mesothorax width were measured on 88 individuals representing all the localities listed below. Head width was taken as the criterion for size, and on this basis the smallest female (head width  $169\ \mu$ ), one of the largest ( $205\ \mu$ ) and an intermediate one were selected for measuring.

*Measurements of one female* (the smallest found, X.137-5 taken on *Cynanchum obtusifolium* L.f. at Glencairn on the Cape Peninsula, 18-iii-1953) in  $\mu$ , followed in parentheses by the ranges of this plus two other females, one of the largest, from Ifafa Beach, Natal, 28-viii-1953, on banana, and an intermediate one, NaOH-treated, taken on *Pergularia extensa* R.Br., 18-x-1955, at Richards Bay, Zululand: Length (distended)  $1262\text{--}(1590)$ ; head L.  $106\text{--}(123)$ , W. across eyes  $167\text{--}(193)$ , W. across cheeks  $169\text{--}(205)$ , W. on basal collar  $148\text{--}(169)$ ; eyes dorsal L.  $59\text{--}(89)$ , ventral L.  $64\text{--}(55\text{--}72)$ , dorsal W.  $?(47\text{--}51)$ , interval  $80\text{--}(97)$ , ventral W.  $?(42\text{--}51)$ , interval  $?(93\text{--}110)$ ; ocelli: anterior-posterior  $13\text{--}(15)$ , interval of posterior pair  $21\text{--}(25)$ , diameters longit./transv. anterior  $6(6)/17(17)$ , posterior  $17\text{--}(19)/15(13\text{--})$ ; interocellar setae  $11\text{--}(13)$ , post ocellars  $11\text{--}(17)$ ; mouth-cone L. from posterior dorsal margin of head  $127(120\text{--}134)$ ; pronotum L.  $101\text{--}(123)$ , W.  $191\text{--}(233)$ , its setae: anterior sub-marginal  $17\text{--}(23)$ , aa.  $21\text{--}(25)$ , ml.  $19(13\text{--})$ , posterior-angular  $17\text{--}(23)$ , pmm.  $17\text{--}(25)$ , discal setae  $13\text{--}(25)$ ; mesothorax W.  $240\text{--}(303)$ , mesonotum L.  $64\text{--}(80)$ , W.  $161\text{--}(205)$ ; metathorax W.  $233\text{--}(296)$ , metanotum: strongly sclerotized sclerites: anterior L.  $68\text{--}(85)$ , W.  $123\text{--}(155)$ , posterior L.  $25\text{--}(38)$ , W.

114(—137); fore-wing L. 692(—870), W. across scale 80(—110), W. at middle 47(—55), W.  $80\mu$  from apex 42(—51), fringe anterior 127(—169), posterior 331(—437); legs L./W. ff. 99(—113)/42(—55), ft. 99(—120)/42(—51), fta. 64(—71)/23(—25); hf. 141(—176)/42(—51), ht. 162(—219)/34(—42), hta. 78(—92)/21(—25); abdomen L. 846(—1046), W. 289(—377); tergite ix setae S.1: 91(—110), their interval 23(—30), S.2: 91(—106), S.3: 76(—97), S.4 (mid-lateral) 42(—59); tergite x setae: S.1 72(59—), S.2: 57(47—).

Antenna: total L. 289(—331)

Segm.	L.	W.	Segm.	L.	W.
i . . . . .	17(17)	25(—30);	v . . . . .	38(—42),	23(23) .
ii . . . . .	34(—38),	30(—32);	vi . . . . .	30(30)	21(21) .
iii . . . . .	64(—76),	21(—23);	vii . . . . .	15(—17),	11(11) .
iv . . . . .	47(—57),	21(—23);	viii . . . . .	38(—44),	4(—6).

*Male* (macropterous). Length 1.1—1.4 mm. (distended). Smaller than the female, but very similar to it in colour and structure, with the following differences: pterothorax somewhat paler, abdomen distinctly paler, segments ii-vii uniformly light brown, and the apex brownish yellow, or ii-v yellowish brown, vi and vii still paler, brownish yellow, viii and ix largely yellow.

Microtrichia on abdominal tergites, as seen on ♂♂ mounted laterally after NaOH-treatment, present on segments ii to viii; dorso-ventral height in  $\mu$ , measured from pleural sclerite, followed by cephalo-caudal length in parentheses, of area bearing microtrichia on lateral parts of tergites ii-viii, measured on one male: 51(80), 42(38), 34(34), 25(25), 21(21), 21(21), 17(13).

Three pairs of strong spines on tergite ix well-developed, as illustrated (figs 9 and 10); these spines differ from those of the other four species of the genus whose males are known in being approximately equal in thickness, and in having the third pair 1.1—1.7 times as far apart as the first pair, as against 1.9—2.5 times as far apart in the other species.

Glandular areas on sternites small and of unusual form, as illustrated (fig. 12); L/W. in  $\mu$ , measured on one male, of these gland-openings on iii-vii: 6/13, 4/15, 6/19, 9/21, and 9/21.

On males mounted laterally one sees that the tergites and sternites on segments iii-viii are deeply depressed or grooved behind the antecostal line, the deepest part of the groove being at about anterior third of total length of each segment. The greatest depth of the groove is about 8—10  $\mu$  below the line of the highest anterior and posterior parts of the segments, as measured laterally. (See the drawing of the lateral aspect of segment viii on fig. 10). In males mounted dorso-ventrally these grooves are not seen at the sides.

*Measurements of one male* (No. X.824-5, intermediate in size, taken on *Canthium inerme* (L. f.) O. Ktze, at Knysna C.P. on 11-ii-1954), in  $\mu$ , followed in parentheses by the ranges of this plus two other males, both NaOH-treated, the smallest found, from Port St. Johns C.P. 9-vi-1942 on *Vernonia angustifolia* D.C., and the largest, from Ifafa Beach, Natal, 28-viii-1953: Length (distended)

1350(1140—); head L. 112(103—119), W. across eyes 157(152—169), W. across cheeks 165(157—174), W. on basal collar 133(127—136); eyes dorsal L. 68 and 72(64—74), ventral L. 64(59—70), dorsal W. 42(38—44), interval 76(70—85), ventral W. 42(32—), interval 76(—85); ocelli: anterior-posterior 15(13—), interval of posterior pair 19(17—23), diameters longit./transv. anterior 9(9)/17(15—19), posterior 17(—19)/11(—13); interocellar setae 13(9—), post-ocellars ?(12); mouth-cone L. from posterior dorsal margin of head 85(56—106); pronotum L. 97(93—101), W. 186(93—101), its setae: anterior sub-marginal 21(17—), aa. 21(17—), posterior angular 17(13—19), discal 17(13—19); mesothorax W. 240(229—247), mesonotum L. 72(71—78), W. 165(141—), its setae 13(9—); metathorax W. 236(229—243); metanotum: strongly sclerotized sclerites: anterior L. 68(64—72), W. 123(101—), posterior L. 30(—32), W. 93(—101), fore-wing L. 708(692—716), W. across scale 91(80—92), W. at middle 47(38—), W. 80  $\mu$  from apex 42(38—), fringe anterior 116(113—120), posterior 346(282—); legs L./W. ff. 120(99—)/44(—49), ft. 106(—113)/40(38—42), fta. 64(56—71)/21(—23); hf. 148(127—)/40(—42), ht. 172(148—183)/34(34), its spurs 19(—25), its inner row of 11—12 setae: L. 21(21), hta. 64(49—85)/21(—23); abdomen L. 939(716—), W. 240(223—254); latero-median setae tergites iii-vii on two ♂♂ 34—47  $\mu$  long; tergite viii: lateral seta just in front of spiracle L. 47(47), one behind spiracle 30(—34) posterior-angular 42(—47); tergite ix, thick median spines, anterior pair L. (part outside socket only) 16(14—), W. 4(—5), interval 11(—12), middle pair L. 16(16), W. 4(—5), interval 9(8—), posterior pair L. 16(15—19), W. 4(4), interval 17(16—); tergite ix setae: dorso-median ?(34—42), three lateral pairs from cephalic pair caudad L. 42(—51), L. 30(—34), L. 51(—55); tergite x postero-angular setae L. 59(55—).

Antenna total L. 303(278—).

Segm.	L.	W.	Segm.	L.	W.
i . . . . .	21(17—),	25(23—);	v . . . . .	36(34—)	, 21(—23).
ii . . . . .	34(27—),	27(—30);	vi . . . . .	25(—27)	, 19(19) .
iii . . . . .	72(64—),	23(19—);	vii . . . . .	15(13—)	, 11(11) .
iv . . . . .	51(47—),	21(—23);	viii . . . . .	40(36—47),	4(—6) .

Material studied: 124 ♀♀ and 23 ♂♂, including 7 ♀♀ and 2 ♂♂ kindly identified for the writer by Dr. J. D. Hood, mounted in Canada balsam, collected as follows: Zululand: Richards Bay, on *Pergularia extensa* R. Br., 18-x-1955, J.C.F., 6 ♀♀; Natal: Durban, on undetermined plant, 6-xi-1935, J.C.F., 1 ♀, 2 ♂♂; Ifafa Beach, on banana, 28-viii-1953, S.A. Roach, 36 ♀♀, 2 ♂♂; Port Shepstone, on *Asparagus falcatus* L., 9-iii-1940, W. Powell, 1 ♀, 1 ♂; Cape Province, all collected by the writer: Port St. Johns, on *Turraea floribunda* Hochst., 30-v-1942, 4 ♀♀, 1 ♂, beating dead branches, June 1942, 1 ♀, 1 ♂, on *Vernonia angustifolia* D.C., 9-vi-1942, 26 ♀♀, 10 ♂♂; Knysna, on *Chenopodium* cf. *vulvaria* L., 8-ii-1954, 2 ♀♀, 5 ♂♂, on *Canthium inerme* (L.f.) O.Ktze, 11-ii-1954, 4 ♀♀, 1 ♂; Hermanus, on

*Cineraria geifolia* L. 22-xii-1922, 5 ♀ ♀, Cape Town, on *Canthium inerme* (L.f.) O.Ktze, 20-iii-1953, 3 ♀ ♀; Glencairn, Cape Peninsula, on *Arum*, 18-iii-1953, 27 ♀ ♀, on *Cynanchum obtusifolium* L. f. 18-iii-1953, 8 ♀ ♀.

All the material before me was collected near the seashore during relatively dry months of the year. Early in December 1956 Professor M. J. Oosthuizen kindly undertook a survey of banana plantations on the South Coast of Natal, in order to endeavour to find further series of specimens, especially males, for me; he found many specimens of a species of *Thrips* under the bracts of the male flowers of bananas, but not one specimen, male or female of *H. bicinctus*. He reported that there was heavy rain at the time.

In a letter dated 23-xi-1956, Mr. A. J. Prins, entomologist at the Cedara College of Agriculture, Natal, wrote, with reference to specimens collected by Mr. S. A. Roach at Ifafa Beach in August 1953, that *H. bicinctus* had produced silvery blemish on green bananas. He added: "During a recent visit to the South Coast it appeared that these thrips occur on most banana farms. Most of the farmers are of the opinion that the thrips do more damage than the stinkbug *Cryptacrus comes* Fabr., which is found in large numbers on green bananas."

Males appear to occur in small numbers; the only occasion on which about 50 % of the catch consisted of males was at Port St. Johns, 9-vi-1942 on *Vernonia*.

The differences between *bicinctus* and the other species of the genus are indicated in the accompanying key.

### ***Hercinothrips jansei* spec. nov. (Figs. 15—17)**

*Female* (macropterous). Length (not distended to slightly distended) about 1.1—1.2 mm. *Colour*: bicolorous, head and thorax yellow, abdomen largely brown, wings largely grey; head yellow; eyes so deep red as to appear black; ocellar crescents bright red; antennae: i pale yellow, ii, iv and v yellow tinged with pale brown, iii yellow, feintly tinged with pale grey, vi and vii brownish grey, viii grey; on some females ii, iv and v paler, only very feintly shaded; mouth-cone yellow, with sclerotized parts and palpi pale brown; pronotum yellow, very feintly tinged with grey, and with a narrow (internal) pale brown line on each side near lateral edges and parallel with them; pterothorax yellow above and below, orange-yellow on sides, with some of the internal structures showing through as pale brown lines; *fore-wings* measured on 5 wings of 5 ♀ ♀ ) largely grey, as illustrated (fig. 17); the basal pale area occupies 0.2—0.3 of total wing length, is yellow in about the basal two-thirds of its own length, and colourless in the distal third; the median grey area occupies 0.7 of wing length and is not uniformly dark throughout its length, being slightly paler in a longitudinal stripe between the veins, and sometimes showing a tendency to become paler in about its median one-third, more especially on posterior half; the distal pale area is colourless and occupies 0.05—0.07 of wing length; the large dark area of fore-wings is approximately equal in length to the dark part of the abdomen, over which it lies when the wings are in position of rest over the body; hind-wings with a narrow

longitudinal dark stripe throughout most of length, feintly tinged with grey in about middle one-third, other two thirds almost colourless.

*Legs* yellow, except brown tarsal cups and middle femora and tibiae which are lightly tinged with grey; abdomen: tergite i yellow; tergites and sternites ii-vii brown, tergite vii yellowish brown in about median third on posterior half; tergites ii-vii each with a prominent darker antecostal line about  $20\ \mu$  from anterior margin, sternites iii-vii with a similar transverse line and a slightly heavier and slightly arcuate line in front of it; tergite viii yellow in middle third, yellowish brown in two lateral thirds, segment ix yellow above and below, narrowly tinged brown at lateral edges, segment x greyish yellow; *major setae* of body and appendages yellow or colourless, except those on costa and two other veins on the grey area of the fore-wings, which are dark grey to brown; fringes of wings yellow or pale grey, except costal fringe in about distal one-third of fore-wing, four conspicuous thicker fringe hairs at apex of fore-wing on hind margin, and some of the other fringe hairs, which tend to become grey.

*Sculpturing* very similar to that described above in *Hercinothrips bicinctus* (Bagnall), with these differences: sculpturing of pronotum weaker, although the wrinkles are distinctly visible, and on about the median third of its anterior half there are anastomosing lines which form a few transversely elongated cells, instead of subquadrate or subhexagonal reticles; mesonotum more strongly wrinkled over whole surface except the small, cephalic, unsculptured subtriangular area; posterior strongly sclerotized sclerite of metanotum more distinctly reticulate, its whole surface with well-defined subhexagonal reticles; sculpturing on abdominal tergites: the clavate reticles are generally somewhat wider, less regularly arranged and the handles of the clubs are not noticeably darker, while the sculpturing tends to become weaker on a middorsal longitudinal stripe about  $70\ \mu$  wide.

*Head* wider than long, the ratio  $L/W$  being 0.6, greatest width is across cheeks and this is about 3 to  $7\ \mu$  greater than width across eyes, the ratio  $W$ . across eyes, over least  $W$ . at base 1.1; head 1.1—1.4 as long as pronotum; *eyes* large, bulging slightly, coarsely and fairly closely faceted, their dorsal length 0.6 of total head length and about 2— $11\ \mu$  greater than ventral length; six facets on ventral aspect retain a yellow colour after treatment with NaOH; *cheeks* usually slightly rounded behind eyes, with a blunt point near base and a constriction behind it; interantennal space as wide as segment one of antennae or slightly wider; *ocelli* on a flattened hump raised about 13— $17\ \mu$  above the dorsal surface of the head and about 38— $47\ \mu$  long, as seen laterally; the anterior ocellus directed cephalad, the posterior ones dorso-laterad, the interval between the posterior pair approximately equal to one-third of dorsal interval between the eyes; *head setae* as illustrated (fig. 16), with one close to inner dorsal posterior angle of eye; cheek setae usually not visible, but a fairly thick one about  $11\ \mu$  long seen on some of the females; ventral head setae similar to those of *H. bicinctus* described above.

*Mouth-cone* heavy, broadly rounded at apex, extending across the prosternum: Palpi, measured on two females, NaOH-treated: L./W. in  $\mu$ , maxillary segment i: 13—15/9, ii: 30/4—6, labial 13/3—4.

*Antennae* as illustrated (fig. 15); the forked sense-cone on iii is situated laterally or ventro-laterally and is in most cases difficult to see; I believe it is typically broadly V shaped but there may be a very short stem, so that it becomes Y shaped in some cases; it is about 11—17  $\mu$  long and each arm is about 2  $\mu$  thick; the forked cone on iv, situated ventrally towards the outer side, is broadly V shaped or U shaped and measures 20—25  $\mu$  in length, each arm about 2  $\mu$  thick; directly above it there is a thin (?) simple cone similar to that described under *H. bicinctus* above; v has one simple cone on outer side about 8 long by 2  $\mu$  wide; on vi the long inner cone about 21—25  $\mu$ , the outer only 8—9  $\mu$  long; vii has an outer cone near base about 15—17  $\mu$  in length; areola on ii more or less as in the *typus generis*.

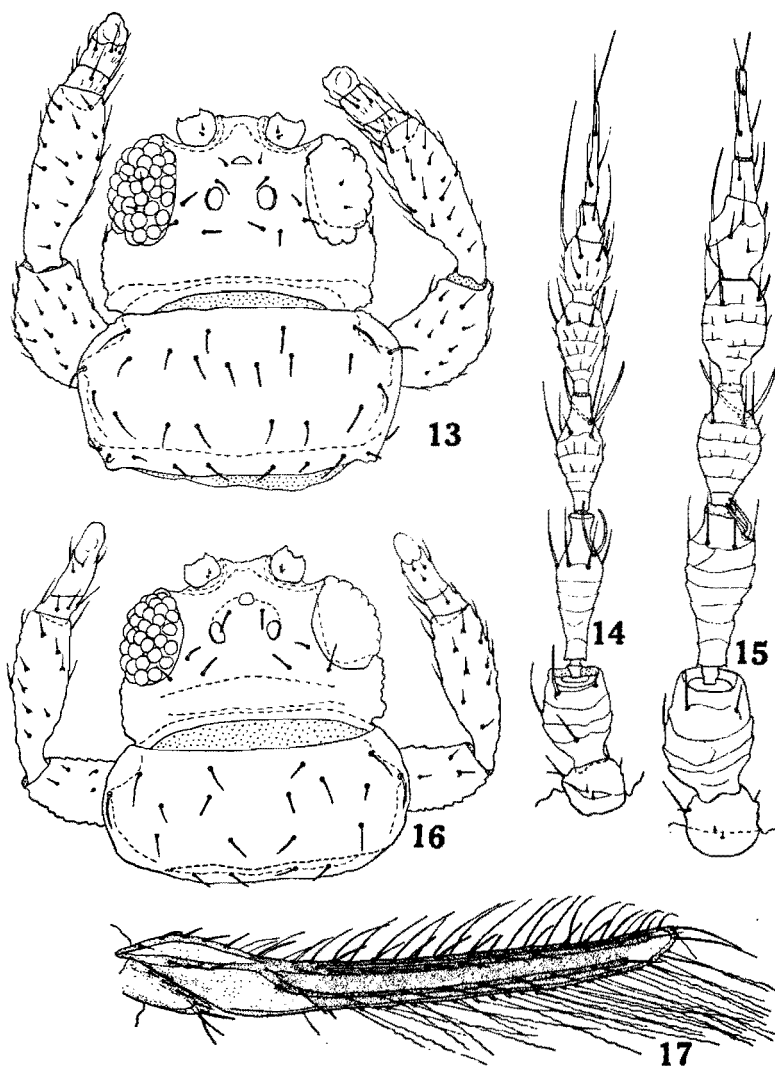
*Pronotum* strongly transverse, 0.4—0.5 as long as its own width and 0.7—1.0 as long as the head; structure similar to that described above for *H. bicinctus*, but without median dorsal apodeme; 6 setae on hind margin, and 17—18 on the disc arranged more or less in three transverse rows. Mesonotum and its setae similar to those of *bicinctus*. Metanotum divided into two strongly sclerotized sclerites, the anterior with the triangular scutellum usually fairly well demarcated at least in posterior half, its pair of pores usually cephalad of the pair of setae but sometimes one pore in front of and the other behind the setae.

*Forewing*: upper surface densely clothed with minute curved microtrichia; its shape and setae as illustrated (fig. 17); veins fairly prominent, the anterior so close to ring vein as to appear to be fused with it; wing-setae counted on 6 females including the largest and smallest in the series (as determined by head width): costa with 18—21, excluding that at apex, their maximum length 42—64  $\mu$ , those near apex similar to fringe hairs, anterior vein with 3 before fork plus 9—13, total 12—16, length 38—51  $\mu$ , posterior vein with 7—11 (9 on 4 wings), their length 40—51  $\mu$ ; scale with 4 or 5 setae on its prominent vein, in addition to the two near apex close together; hind wings, and legs, similar to those of *H. bicinctus* described above.

*Abdomen*: structure so similar to that of *H. bicinctus* that a detailed description is not necessary. Lengths of tergites including fringes on median dorsal line measured on one NaOH-treated female of fairly large size (head width 190  $\mu$ ): tergite i: 51  $\mu$ , ii-vii: 85—99, viii: 106, ix: 85 and x: 64  $\mu$ .

Fringes and teeth as in *bicinctus* except that the "spines" on viii are not quite so sharp and thin and the comb-free median part is only about 47—51  $\mu$  wide.

Microtrichia well-developed on sides of tergite ii, but not extending over full length of tergite, the area covered by them extending about 80  $\mu$  dorsad from the pleural sclerite, and about 55  $\mu$  long, as measured on a female mounted laterally; on iii the sub-triangular area bearing microtrichia is only



*Hercinothrips bicinctus* (Bagnall).

Fig. 13 — ♀, head and prothorax.

14 — ♀, right antenna.

*Hercinothrips jansei* spec. nov.

Fig. 15 — ♀, paratype, right antenna.

16 — ♀, paratype, head and prothorax.

17 — ♀, paratype, right fore-wing.

Figs. 13—17: Mrs M. Meyer del. (Projection apparatus).

about  $68\mu$  high and  $36\mu$  long at its longest end near the pleural sclerite; tergite iv bears about 10–20 weakly developed microtrichia near its antero-lateral angle on some females. Lateral setae on tergites ii–vii only about 25–30  $\mu$  long; on viii the pair immediately in front of spiracles  $34\mu$  long, and the pair at hind angles about 38–47  $\mu$ . Pores very similar to those on the type species of the genus.

*Measurements of holotype* (macropterous female No. B.74–1) in  $\mu$ , followed in parentheses by the ranges of this plus two paratype females, one of these NaOH-treated, these three females including the largest and smallest in the series, according to head width: Length (not distended to slightly distended) 1262(1046—); head L. 127(102—), W. across eyes 190(176—), greatest W. (across cheeks) 197(179—), W. on basal collar 169(155—); eyes dorsal L. 72(57—), W. 47(38—), interval 97(82–103), ventral L. 64(55—), W. 42(36–44), interval 106(103—); ocelli anterior-posterior 21(17—), interval of posterior pair 30(27–32), diameters longit./transv. anterior 6(6)/17(13—), posterior 15(13—)/9(9—); head setae: interocellars 17(15—), postoculars ?(15–17); mouth-cone L. from posterior dorsal margin of head 92(—106); pronotum L. 92(85–97), W. 219(190—), setae near anterior margin in middle 23(19—), posterior median marginal 23(17—), discals 17(17); mesothorax W. 275(254—), mesonotum L. 72(64—), W. 190(169—); metathorax W. 282(257—), strongly sclerotized sclerites of metanotum anterior L. 68(59—), W. 162(141—), posterior L. 25(21—), W. 141(113—); fore-wing L. 716(615—), W. across scale 93(85—), W. at middle 64(53—), W.  $80\mu$  from apex 55(47—), fringe anterior 130(106—), posterior 317(296—); legs L./W. ff. 120(92—)/49(40—), ft. 113(102—)/44(38—); fta. 49(—56)/21(21); hf. 141(134—)/47(34—), ht. 205(169—)/38(34—), its spurs 25(21—)/4(2—); hta. 85(68—)/21(21); abdomen L. 831(677—), W. 374(331—); tergite ix setae S.1: 80(68—), their interval 25(23—), S.2: 85(68—), S.3: 80(72—), S.4 (mid lateral) 42(38–47); tergite x setae: S.1: 72(59—), S.2: 57(47—).

Antennae: total L. 292(247—).

Segm.	L.	W.	Segm.	L.	W.
i . . . . .	21(17—),	25(25) ;	v . . . . .	42(36—),	23(—25).
ii . . . . .	42(34—),	30(—34);	vi . . . . .	30(25—),	21(21) .
iii . . . . .	68(51—),	23(—25);	vii . . . . .	15(13—),	9(—11).
iv . . . . .	47(42—),	23(23) ;	viii . . . . .	32(32) ,	4(—6) .

Material studied: 21 macropterous females, taken on a bush, *Monechma pseudopatulum* C.B.Cl. (fam. Acanthaceae) on a hill on the outskirts of the town of Prieska on the Orange River, northern Cape Province, on 8-v-1941 by the writer.

The differences between *jansei* spec. nov. and the other known species of the genus are indicated in the accompanying key. The new species resembles *femoralis* (Reuter) in colour of forewings, but differs from it in having (1) the pterothorax and hind femora yellow and (2) segment viii of

the antennae about 12—15  $\mu$  shorter. It is similar to *dimidiatus* Hood in having the body strikingly bicolorous but differs in bearing microtrichia on segment ii-iv of the abdomen only instead of on ii-vi.

I take great pleasure in naming this interesting new form for my colleague and friend Professor Dr. A. J. T. Janse, as a small token of appreciation of his monumental achievements in the study of the South African Lepidoptera.

### Acknowledgments.

I am indebted to the Authorities of the British Museum for the loan of cotypes and paratypes of *Caliothrips graminicola* (Bagnall and Cameron).

To Dr. R. zur Strassen I express my appreciation of his valuable assistance in the preparation of this paper.